REMARKS

This Amendment is responsive to the Office Action dated February 21, 2008. Applicant has amended claims 1, 4, 7, 8, 9, 32, 34, 35, 38, 39, 40, 62, 65, 68, 69 and 70. Applicant previously cancelled claims 16-31 and 47-61. Claims 1-15, 32-46, and 62-79 are pending.

Claim Objection

The Office Action objected to claims 34 and 35 because at line 4 of claim 34 "ore" should be "or." Applicant has deleted "ore" and replaced it with "or" in claim 34. Applicant respectfully requests withdrawal of the claim objection.

Claim Rejection Under 35 U.S.C. § 101

The Office Action rejected claims 62-76 and 79 under 35 U.S.C. § 101, and indicated that these claims cover any medium that is capable of storage, including signals that were found to be non-statutory in the case *In re Nuijten*, 84 USPQ2d 1495 (Fed. Cir. 2007).

Applicant has amended claim 62 to address this concern. Applicant respectfully traverses the rejection to the extent such rejection may be considered applicable to the amended claims. Specifically, Applicant has amended the claim 62 to recite "a computer-readable storage medium comprising one or more memory devices that store instructions that cause one or more processors" to carry out the stored instructions. Exemplary support for amended claim 62 can be found at paragraph [0016] of Applicant's specification. For example, paragraph [0016] discloses memories 16 and 18 that store instructions for use by processor 6 and DSP 10. Examples of memories 16 and 18, as disclosed in paragraph [0016], include read-only memory (ROM), synchronous dynamic random access memory (SDRAM), non-volatile static random access memory (SRAM), Flash memory, electrically erasable programmable read-only memory (EEPROM), and the like.

As amended, claims 62-76, and 79 clarify that the storage medium comprises one or more memory devices. This should address the Examiner's concerns. Accordingly, Applicant respectfully requests withdrawal of the 35 U.S.C. § 101 rejection for claims 62-76, and 79.

Claim Rejection Under 35 U.S.C. § 112

The Office Action rejected claims 62-76 and 79 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, and rejected claims 4, 8, 35, 39, 65 and 69 under 35 U.S.C. 112 second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant traverses these rejections to the extent such rejection may be considered applicable to the amended claims.

Claims 62-76, and 79

Applicant has amended claims 62 to recite, "A computer-readable storage medium comprising one or more memory devices that store instructions that cause one or more processors" to carry out the stored instructions. This change is address above, and should overcome any concerns over written description.

Applicant respectfully requests withdrawal of the rejections of claims 62-76, and 79 under 35 U.S.C. § 112, first paragraph.

Claims 4, 35, and 65

In the Office Action, the Examiner rejected claims 4, 35, and 65 under 35 U.S.C. § 112, second paragraph, as being indefinite. In response, Applicant has amended claims 4, 35, and 65 for purposes of clarification. Claims 4, 35, and 65 now more clearly comply with 35 U.S.C. § 112, second paragraph.

With respect to claims 4, 35, and 65, the Office Action noted some disagreement between the terminology of claims 3, 34, and 64 and the terminology of claims 4, 35, and 65, which depend upon claims 3, 34, and 64, respectively. In order to clarify this issue, Applicant has amended claims 4, 35, and 65, and respectfully submits that the amendment to claims 4, 35, and 65 address the Examiner's concerns. In view of these clarifications, Applicant respectfully requests withdrawal of the rejections of claims 4, 35, and 65 under 35 U.S.C. § 112, second paragraph.

Claims 4, 35, and 65 were not rejected based on any prior art. Therefore, following entry of the current amendments, Applicant respectfully requests a favorable indication regarding the allowability of dependent claims 4, 35, and 65.

Claims 8, 39, and 69

With respect to claims 8, 39, and 69, the Office Action indicated that the term "T" of M^T_C is not defined[1]. In order to address these concerns, Applicant has amended claims 8, 39, and 69 to clarify that M^T_C is a transpose of matrix M_C. In addition, claims 8, 39, and 69 have been amended to clarify that M^{-1} is an inverse coefficient matrix.

These notations for transpose and inverse functions in Matrix mathematics are well known notations in matrix mathematics that would have been easily understood by a person of ordinary skill in the art. As clear evidence that these notations are well known, Applicant refers the Examiner to:

http://en.wikipedia.org/wiki/Matrix_(mathematics)

This web page provides clear evidence that the notations for transpose and inverse functions used in Applicant's claims are well known and widely accepted notations in matrix mathematics. In view of these clarifications, Applicant respectfully requests withdrawal of the rejections of claims 8, 39, and 69 under 35 U.S.C. § 112, second paragraph.

Claims 8, 39, and 69 were not rejected based on any prior art. Therefore, following entry of the current amendments, Applicant respectfully requests a favorable indication regarding the allowability of dependent claims 8, 39, and 69.

Claim Rejection Under 35 U.S.C. § 102 and § 103

In the Office Action, the Examiner rejected claims 1, 2, 5, 6, 9, 10, 11, 12, 15, 32, 33, 36, 37, 40,41, 42, 43, 46, 62, 63, 66, 67, 70, 71, 72, 73 and 76-79 under 35 U.S.C. 102(b) as being anticipated by Watkins (US 5,598,517). In the Office Action, the Examiner rejected claims 3, 7, 34, 38, 64 and 68 under 35 U.S.C. 103(a) as being unpatentable over Watkins in view of Pineda ("A Parallel Algorithm for Polygon Rasterization"), and rejected claims 13, 14, 44, 45, 74 and 75 under 35 U.S.C. 103(a) as being unpatentable over Watkins in view of Applicant's admissions of prior art (AAPA). Applicant

prior art (AAPA). Applicant respectfully traverses the rejections to the extent such rejections may be considered applicable to the amended claims. The applied references fail to disclose or suggest the features of Applicant's claims. Furthermore, the prior art fails to suggest any rational reason that would have led a person of ordinary skill in the art to arrive at the features of the current claims.

Independent claim 1 recites an apparatus comprising a rendering engine that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels, and the rendering engine further selects each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and stores information indicating which of the pixels fall within the triangular area.

[1] Office Action, dated Feb. 21, 2008, page 10.

For purpose of illustration, Applicant has reproduced FIG. 2 of the present application below.

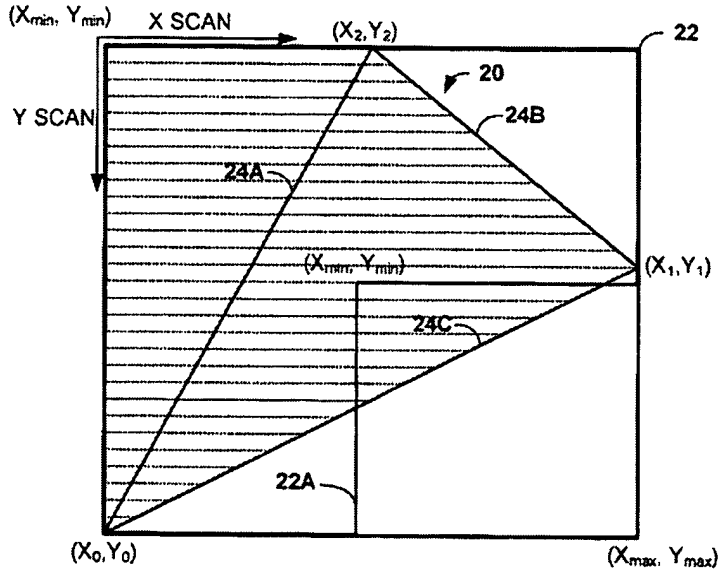


FIG. 2

As illustrated in FIG. 2, rectangular area 22 bounds an entire triangle to be rendered. In this example, the entire triangle to be rendered is defined by edges 24A, 24B and 24C, or alternatively by vertices (X_0, Y_0), (X_1, Y_1) and (X_2, Y_2).

As illustrated by the dotted lines in FIG. 2, coordinates are evaluated starting at one end of the rectangular area to determine whether the pixels fall within the triangular area. Then, upon determining that at least one pixel of a line falls within the triangular area and a current pixel no longer falls within the triangular area, the evaluation of the coordinates ceases for that line. The ceasing of these evaluations is illustrated by the absence of dotted lines in the X-direction beyond the right-most sides of the triangle to be rendered. In this case, the computations associated with theses ceased evaluations can be avoided to promote processing efficiency.

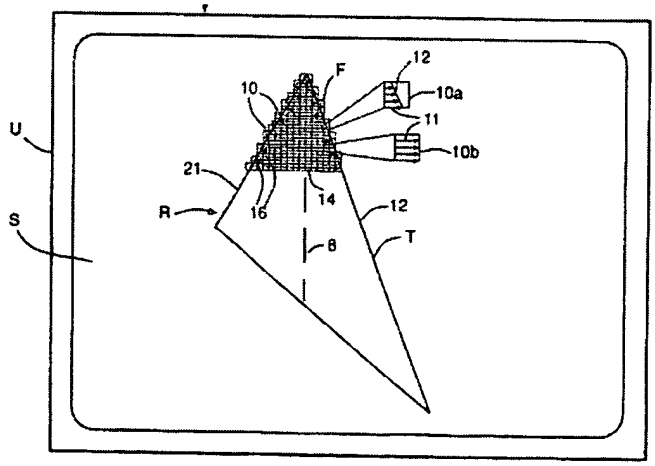
Claim 1 specifically recites such features. In particular, claim 1 requires that the rendering engine sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the pixels fall within the triangular area, and ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls

current pixel no longer falls within the triangular area.

These features of claim 1 can provide advantages associated with a rendering engine that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. In particular, a bounding rectangular area can provide a very simple way to assess the area of a triangle, e.g., exploiting the simplicity associated with a bounding rectangular area. In block based video coding scenarios, for example, a bounding rectangular area may be simple to define and implement.

At the same time, however, the features of claim 1 can reduce the number of computations required for triangular rendering in the context of a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Specifically, claim 1 requires that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. By ceasing such evaluations, efficient processing is promoted.

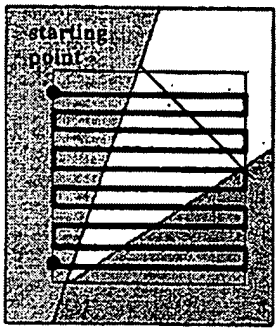
The teaching of Watkins and Pineda (either alone or in combination) fails to discloses or suggest the features of claim 1. The illustration below is a portion of FIG. 1 of Watkins.



In this case, Watkins clearly shows a triangle being rendered on a display screen S. However, Watkins does not define any rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Instead, Watkins scans only those pixels that are bounded by the triangle itself. Watkins scans back and forth within the triangle, but does not evaluate coordinates associated with the pixels of the line of pixels starting at one end of a rectangular area to determine

rectangular area to determine whether the pixels fall within the triangular area. For this reason, claim 1 clearly distinguishes the teaching of Watkins.

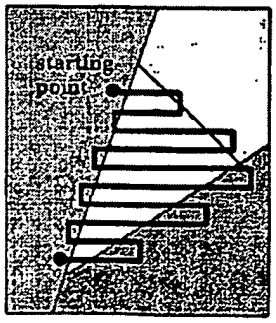
The teaching of Pineda is similar to Watkins in some embodiments, but also provides additional embodiments, such as that shown in the figure reproduced below, which corresponds to a portion of FIG. 3 in Pineda.



Traversing the Bounding Box

This FIG. from Pineda shows a conventional way of traversing a bounding rectangular area, e.g., "bounding box." In this case, however, Pineda fails to disclose or suggest that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, as required by claim 1. In particular, the FIG. above clearly shows that Pineda evaluates all of the coordinates of the bounding box.

Pineda then shows a "more efficient traversal algorithm," in the section portion of FIG. 3 reproduced below.



A More Efficient Traversal Algorithm

This example, however, is very similar to the teaching of Watkins discussed above. In particular, this

this example from Pineda does not define any rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Instead, this example from Pineda scans only those pixels that are bounded by the triangle itself. In this case, Pineda scans back and forth within the triangle, but does not evaluate coordinates associated with the pixels of the line of pixels starting at one end of a rectangular area to determine whether the pixels fall within the triangular area. For this reason, claim 1 clearly distinguishes this teaching of Pineda.

The features of the current claims provide a different approach than those of Watkins or Pineda. Moreover, the features of claim 1 can provide advantages of simplicity associated with a rendering engine that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. At the same time, the features of claim 1 may reduce the number of computations required for triangular rendering in the context of a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered. Specifically, claim 1 recites that the rendering engine ceases evaluation of the coordinates associated with the pixels of the line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area.

In some cases, the techniques of claim 1 may not be as "efficient" as the "more efficient traversal algorithm" of Pineda shown above or the triangle rendering of Watkins discussed above in terms of the number of pixels scanned. However, the features of claim 1 have simplicity advantages relative to the "more efficient traversal algorithm" of Pineda shown above and the triangle rendering of Watkins insofar as the features of claim 1 use a bounding rectangle approach.

In addition, the techniques of claim 1 provide for a reduction in the number of computations relative to the "traversing the bounding box" approach of Pineda shown above. Basically, the techniques of claim 1 provide for the simplicity associated with the "traversing the bounding box" approach of Pineda, while reducing the number of computations associated with this type of simple approach.

In view of the clarifications to claim 1, and the foregoing comments and observations, Applicant respectfully submits that claim 1 is novel and non-obvious over the applied prior art.

Claims 32 and 62

Independent claim 32 recites an apparatus comprising means for rendering that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels, the means for rendering further selects each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the pixels fall within the triangular area, and ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and means for storing information indicating which of the pixels fall within the triangular area.

Claim 32 is similar to claim 1 for purposes of the analysis above. In particular, the different embodiments of Watkins and Pineda fail to suggest any apparatus that comprises a means for rendering that defines a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, sequentially evaluates coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, and ceases evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. Claim 32 generally includes all of the limitations of claim 1, but instead of requiring a rendering engine, claim 32 requires a means for rendering.

Claim 62 recites a computer-readable storage medium comprising one or more memory devices that store instructions that cause one or more processors to: define a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, wherein the rectangular area of pixels includes one or more lines of pixels, select each of the one or more lines of pixels within the rectangular area of pixels, sequentially evaluate coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, cease evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area, and store information indicating which of

triangular area, and store information indicating which of the pixels fall within the triangular area.

Claim 62 is also similar to claim 1 for purposes of the analysis above. In particular, the different embodiments of Watkins and Pineda fail to suggest a computer-readable storage medium comprising one or more memory devices that store instructions that cause one or more processors to define a rectangular area of pixels that bounds an entire triangular area of the pixels that defines a triangle to be rendered, sequentially evaluate coordinates associated with the pixels of each line of pixels starting at one end of the rectangular area to determine whether the one or more pixels fall within the triangular area, and cease evaluation of the coordinates associated with the pixels of each line of pixels upon determining that at least one pixel of the line falls within the triangular area and a current pixel no longer falls within the triangular area. Claim 62 generally includes all of the limitations of claim 1, but instead of requiring a rendering engine to perform the features, claim 62 requires instructions that cause one or more processors to perform the features.

Again, the different techniques of Watkins and Pineda either scan all of the pixels in a bounding box approach without ceasing evaluation, as required by claims 32 and 62, or scan only those pixels that are bounded by the triangle itself, without defining any bounding rectangular area.

In view of these distinctions, claim 32 and 62 should be allowed for at least the same reasons as claim 1 should be allowed.

Dependent Claims

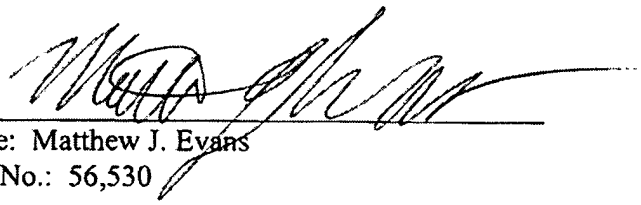
In view of the comments above, dependent claims 2-15, and 77 should be allowed by virtue of their dependency upon claim 1. Dependent claims 33-46, and 78 should be allowed by virtue of their dependency upon claim 32. Dependent claims 63-76, and 79 should be allowed by virtue of their dependency upon claim 62. Applicant reserves substantive comment for dependent claims 2-15, 33-46, and 63-79. In reserving comment, however, Applicant does not acquiesce to the rejections or interpretations of the prior art advanced in the Office Action.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 17-0026. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date: May 21, 2008

QUALCOMM Incorporated
5775 Morehouse Drive
San Diego, California 92121-2779
Telephone: (858) 651-7571
Facsimile: (858) 658-2502

By: 

Name: Matthew J. Evans
Reg. No.: 56,530